COMPLIANCE INFORMATION

UL Listed
C-UL Listed (Canada)
CISPR/EN55022 Class A

FCC Regulations

This equipment has been tested and found to comply with the limits for a class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at the user's own expense.

Canadian Regulations

This digital apparatus does not exceed the Class A limits for radio noise for digital apparatus set out on the radio interference regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la class A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

European Regulations

Warning

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Achtung !

Dieses ist ein Gerät der Funkstörgrenzwertklasse A. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten, in weichen Fällen der Benutzer für entsprechende Gegenmaßnahmen werantwortlich ist.

Attention !

Ceci est un produit de Classe A. Dans un environnement domestique, ce produit risque de créer des interférences radioélectriques, il appartiendra alors à l'utilsateur de prende les measures spécifiques appropriées

VCCI Class 1 Compliance

This equipment is in the 1st Class category (information equipment to be used in commercial and/or industrial areas) and conforms to the standards set by the Voluntary Control Council For Interference by Data Processing Equipment and Electronic Office Machines aimed at preventing radio interference in commercial and/or industrial areas. When used in a residential area or in an adjacent area thereto, interference may be caused to radio and TV receivers, etc. Read the instructions for correct handling.

CAUTION: RJ connectors are NOT INTENDED FOR CONNECTION TO THE PUBLIC TELEPHONE NETWORK. Failure to observe this caution could result in damage to the public telephone network.

Der Anschluss dieses Gerätes an ein öffentlickes Telekommunikationsnetz in den EG-Mitgliedstaaten verstösst gegen die jeweligen einzelstaatlichen Gesetze zur Anwendung der Richtlinie 91/263/EWG zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über Telekommunikationsendeinrichtungen einschliesslich der gegenseitigen Anerkennung ihrer Konformität.

Trademark Notice

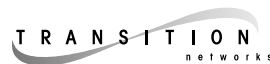All registered trademarks and trademarks are the property of their respective owners.

Copyright Restrictions

33160.A

TRANSITION networks

Minneapolis, MN 55344 USA

10BASE-FL Ethernet™
Unmanaged Fiber Hub with AUI, BNC or Fiber Uplink
E-FL-HB-0800, E-FL-HB-0400
USER'S GUIDE

The rack-mountable E-FL-HB-0800 and E-FL-HB-0400 series unmanaged Ethernet™ fiber hubs allow the network administrator to set up network workgroups connected over fiber and to install an OPTIONAL backbone uplink adapter connection to the workgroups through 10BASE-5 AUI, 10BASE-2 BNC OR 10BASE-FL ST fiber connectors.

E-FL-HB-0800, E-FL-HB-0800(SC)

The E-FL-HB-0800 hub provides eight (8) Ethernet™ **ST** OR **SC** fiber connections to terminal devices plus space at the back for an optional backbone uplink adapter.

E-FL-HB-0400, E-FL-HB-0400(SC)

The E-FL-HB-0400 hub provides four (4) Ethernet™ **ST** OR **SC** fiber connections to terminal devices plus space at the back for an optional backbone uplink adapter.

BACKBONE UPLINK ADAPTERS Optional devices ordered separately that, when installed, provide one of the following Ethernet™ backbone uplink connections:

|	
MA0A	• *AUI connector to transceiver or to 10BASE-5 "thick-net" coaxial cable*
MA0B	• *BNC connector to 10BASE-2 "thin-net" coaxial cable*
MA0F	• *ST connector to multimode fiber*

E-FL-HB-0x00 IN THE NETWORK

Install one E-FL-HB-0x00 hub and use fiber cable to set up a workgroup by connecting the hub to terminal devices.

to hub, switch, or router
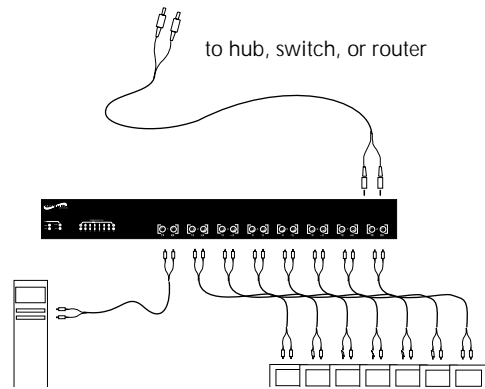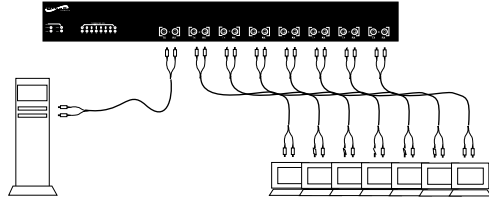
Install an optional backbone uplink adaptor at the back of the hub and use 10BASE-2, 10BASE-5, or fiber cable to connect the workgroup to a network backbone.

Cascade two repeater hubs by connecting fiber cable from a connector at the front of the first hub to a connector at the front of the second hub.

to hub, switch or router
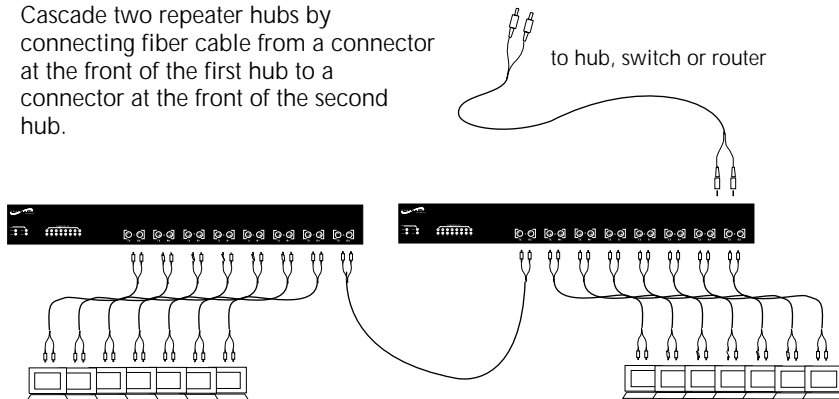
TECHNICAL SPECIFICATIONS

Standards	IEEE 802.3	
Dimensions	17.25" x 8.5" x 1.7"	(437 mm x 216 mm x 43 mm)
Power		
Input Range:	100 to 240 VAC at 50 or 60 Hz, 3.0 A maximum. Rated at 40 watts maximum.	
Environment	Operating Temperature:	0° to 50°C (32° to 122° F)
	Storage Temperature:	-15° to 65°C (5° to 149° F)
	Humidity	5% to 95%, non condensing
	Altitude	0 to 10,000 feet
Warranty	Lifetime	

T R A N S I T I O N networks   **DECLARATION OF CONFORMITY**

Name of Mfg: **Transition Networks**
6475 City West Parkway, Minneapolis MN 55344 USA

Model: **E-FL-HB-0x00 Series Unmanaged Fiber Hub**

Part Number: **E-FL-HB-0800, E-FL-HB-0800(SC), E-FL-HB-0400, E-FL-HB-0400(SC)**

Regulation: **EMC Directive 89/336/EEC**

Purpose: To declare that the *E-FL-HB-0800* or *E-FL-HB-0400* to which this declaration refers is in conformity with the following standards.

EMC-CISPR 22: 1985 Class A; EN 55022: 1988 Class A; EN 50082-1:1992; EN 60950 A4:1997; IEC 801.2, IEC 801.3, and IEC 801.4; IEC 950

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s).

Stephen Anderson, Vice-President of Engineering   November 10, 1999

Date

CABLE SPECIFICATIONS

10BASE-2 Cable Specifications

10BASE-2 CABLE CHARACTERISTICS:

Cable type:	Stranded Coaxial RG58 (ThinNet)
Impedance:	50 Ω @ 10 MHz
Mutual Capacitance:	24 pF/ft ±20% @ 10 MHz
Maximum Cable Length:	185 meters (610 feet)
Maximum number network connections:	30
Minimum distance between connections:	0.5 meters (1.6 feet)

Terminate 10BASE-2 cable at one end using a 50 ohm terminator and at the other end using a 50 ohm terminator grounded to earth ground.

AUI/10BASE-5 Cable Specifications

10BASE-5 CABLE CHARACTERISTICS:

Cable type:	RG8 Solid Coaxial (ThickNet)
Impedance:	50 Ω @ 10 MHz
Capacitance:	26pF/ft
Maximum Cable Length:	500 meters (1650 feet)
Maximum number network connections:	100
Minimum distance between connections:	2.5 meters (8.2 feet)

Terminate 10BASE-5 cable at one end using a 50 ohm terminator and at the other end using a 50 ohm terminator grounded to earth ground.

AUI CABLE AND CONNECTOR SPECIFICATIONS

The cable is a special 4-pair individually shielded with an overall braided shield.
Maximum AUI Cable Length: 50 meters (165 feet)

AUI CONNECTOR CHARACTERISTICS:

AUI Port: Male DB-15 with locking posts.
AUI Connection: Cable shell must be grounded.

Connector Legend:					
	1 Logic Ref.	6 Power Return	11 Logic Ref
	2 Collision+	7 N/C	12 Receive
	3 Transmit+	8 Logic Ref.	13 Power
	4 Logic Ref.	9 Collision--	14 Logic Ref.
	5 Receive+	10 Transmit-	15 N/C

10BASE-FL Cable Specifications

Fiber Optic Cable Recommended:	62.5 / 125 µm multimode fiber
Optional:	100 / 140 µm multimode fiber
	85 / 125 µm multimode fiber
	50 / 125 µm multimode fiber
Wavelength	1300 nM
Fiber Optic Transmitter Power:	min: -__._ dBm max: -__._ dBm
Fiber Optic Receiver Sensitivity:	min: -__._ dBm max: -__._ dBm
Typical Maximum Cable Distance*:	2000 meters (6600 feet)

*Actual distance dependent upon physical characteristics of network installation.

E-FL-HB-0x00 in Half-Duplex Network

The 5-4-3 Rule applies separately to each collision domain. NOTE: A collision domain is any Carrier Sense Multiple Access with Collision Detection (CSMA/CD) network in which a collision will occur if two attached stations transmit at the same time. A segment is the cable connection between two network interfaces.

USING THE 5-4-3 RULE:

The 5-4-3 Rule allows no more than **five** segments in any 10-Mb/sec Ethernet collision domain, no more than **four** repeaters (hubs) and no more than **three** populated segments (10Base-2 or 10BASE-5 coaxial-cable installations).

To determine the size of the collision domain by assigning segment numbers to cable connections, determine the two network devices in a transmission path that are separated by the greatest number of segments. Define a segment path between the network devices by labeling the cable connection to the first device "segment 1" and numbering each segment in the path to the last network device, up to "segment n" (n = total number of segments ≤ 5). Verify that no segment path in the entire collision domain contains more than n ≤ 5 segments.
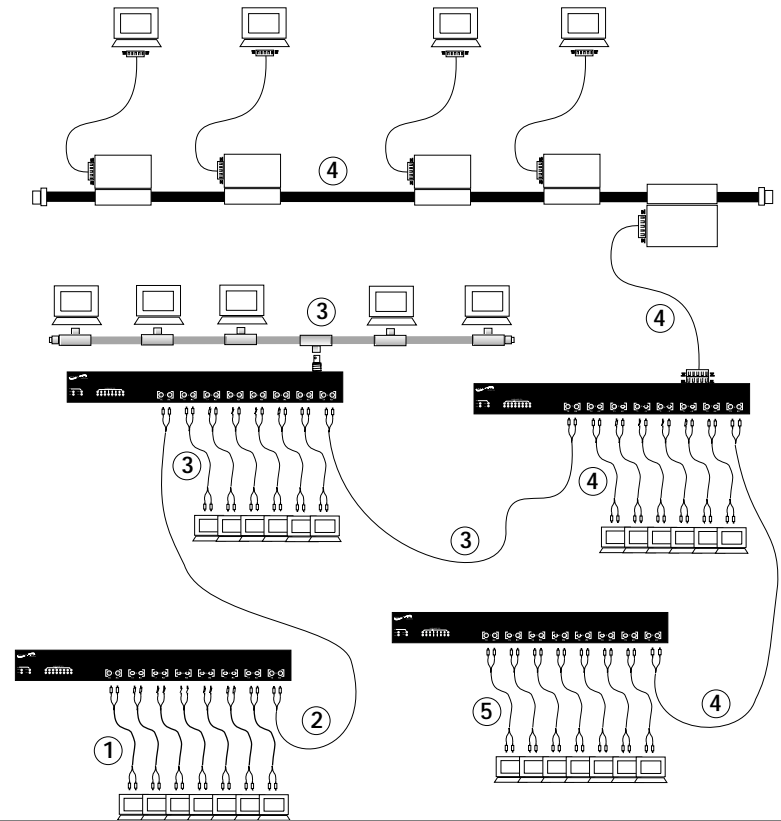
INSTALLATION

Optionally Install Backbone Uplink Adapter

WARNING: Remove AC line cord from power source before installing backbone uplink adaptor in E-FL-HB-0x00. Failure to observe this warning could result in personal injury or death.

CAUTION: Wear a grounding device and observe electrostatic discharge precautions when installing backbone uplink adaptor in the E-FL-HB-0x00. Failure to observe this caution could result in damage to, and subsequent failure of, backbone uplink adaptor.

To install the backbone uplink adapter in the E-FL-HB-0x00:

1. Locate backbone uplink adapter plate at back of E-FL-HB-0x00.

Backbone Uplink Adapter Plate

2. Remove backbone uplink adapter plate by using flatblade screwdriver to remove two (2) screws that secure backbone uplink adapter plate to back of E-FL-HB-0x00.

   NOTE: Retain screws for step 5. (Optionally discard backbone uplink adapter plate.)

3. Carefully slide backbone uplink adapter, component side up, into installation space revealed by removal of backbone uplink adapter plate.

CAUTION: Do NOT force connection. Failure to observe this caution could result in equipment damage and subsequent failure.
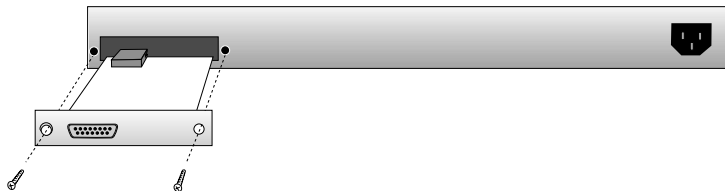
4. Press component on backbone uplink adapter securely against internal mating E-FL-HB-0x00 component until backbone uplink adapter faceplate is flat against E-FL-HB-0x00 chassis.

5. Secure backbone uplink adapter by installing retained screws through backbone uplink adapter into E-FL-HB-0x00 chassis.

6. **Is the *B(ack)B(one) ACT(ivity)* LED illuminated?**

   NO
   - Disconnect and reconnect the backbone cable to restart the initialization process.
   - Restart the attached network device to restart the initialization process.
   - Contact Technical Support: (800) 260-1312.

   YES
   - Continue at step 7.

7. **Is one (or more) of the *10BASE-FL STAT(us)* LEDs illuminated continuously?**

   YES
   - Continue at step 10.

   NO
   - Continue at step 8.

8. **Does one (or more) of the *10BASE-FL STAT(us)* LEDs continuously blink ONCE?**

   YES
   - Check fiber cables for proper connection.
   - Verify that TX and RX cables on E-FL-HB-0x00 are connected to RX and TX ports, respectively, on terminal device. (See page 9.)
   - Ensure that terminal device(s) is/are powered.
   - Contact Technical Support: (800) 260-1312.

   NO
   - Continue at step 9.

9. **Does one (or more) of the *10BASE-FL STAT(us)* LEDs continuously blink TWICE?**

   YES
   - The port is (or ports are) partitioned; investigate the attached terminal device(s).
   - Contact Technical Support: (800) 260-1312.

   NO
   - Continue at step 10.

10. **Is one (or more) of the *10BASE-FL ACT(ivity)* LEDs illuminated?**

    YES
    - The port is (or ports are) operational and receiving data.

    NO
    - Disconnect and reconnect the 10BASE-FL cable to restart the initialization process.
    - Restart the terminal device(s) to restart the initialization process.
    - Contact Technical Support: (800) 260-1312.

FAULT ISOLATION and CORRECTION

If the E-FL-HB-0x00 fails, isolate and correct the fault by determining the answers to the following questions and then taking the indicated action:

1. **Is the P(o)W(e)R LED on the E-FL-HB-0x00 illuminated?**

   NO
   - Is the power cord properly installed in the E-FL-HB-0x00 and in the grounded AC outlet?
   - Does the grounded AC outlet provide power?
   - Contact Technical Support: (800) 260-1312.

   YES
   - Continue at step 2.

2. **Is a backbone uplink adapter installed at E-FL-HB-0x00 back?**

   NO
   - Continue at step 7.

   YES
   - Continue at step 3.

3. **Is the *B(ack)B(one) STAT(us)* LED illuminated continuously?**

   YES
   - Continue at step 7.

   NO
   - Continue at step 4.

4. **Does the *B(ack)B(one) STAT(us)* LED continuously blink ONCE?**

   YES
   - Ensure that backbone uplink adapter is firmly connected.
   - Check backbone uplink cables for proper cabling and connection(s).
   - Ensure that device at remote end of network link is powered.
   - Contact Technical Support: (800) 260-1312.

   NO
   - Continue at step 5.

5. **Does the *B(ack)B(one) STAT(us)* LED continuously blink TWICE?**

   YES
   - If the AUI backbone adapter plate is installed, check the installed transceiver or the drop cable connections.
   - If the BNC backbone adapter plate is installed, ensure that coaxial cable connections are secure and that daisy-chained cable is terminated at both ends. (See page 7.)
   - If the fiber backbone adapter plate is installed and *LINKAlert™* is NOT enabled, the port is partitioned; investigate the device at the far end of the link..
   - If the fiber backbone adapter plate is installed and *LINKAlert™* IS enabled, determine and correct the cause of the Far End Fault.
   - Contact Technical Support: (800) 260-1312.

   NO
   - Continue at step 6.

Install E-FL-HB-0x00 at Site

WARNING: During the site installation, handle the E-FL-HB-0x00 in such a way that the E-FL-HB-0x00 does not fall. Failure to observe this warning could result in injury to personnel and/or equipment damage.

NOTE: If E-FL-HB-0x00 is shipped with brackets installed, proceed to step 2.

To install the E-FL-HB-0x00 in 19-inch rack cabinet:
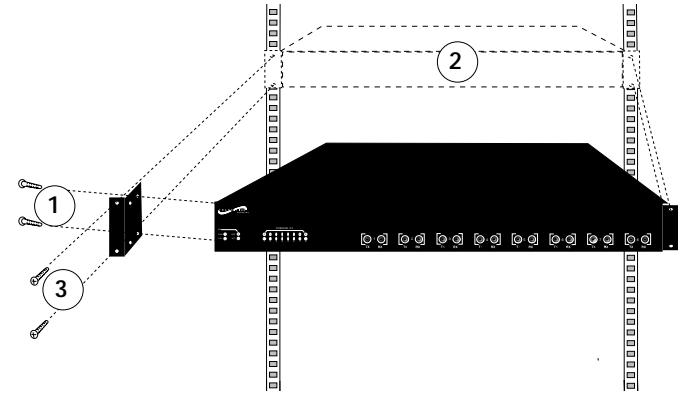
1. Remove and retain two (2) screws located at front left **side** and front right **side** of E-FL-HB-0x00 chassis. Install right and left front brackets (provided) on chassis by installing two (2) retained screws through each bracket into chassis.

2. Carefully align E-FL-HB-0x00 between 19-inch rack mounting rails.

3. Install E-FL-HB-0x00 by installing two (2) screws through right front bracket into rack and two (2) screws through left front bracket into rack, using clip nuts (NOT provided) to secure, if necessary.

To install the E-FL-HB-0x00 on table or other flat surface:

NOTE: Rubber feet are provided.

1. Carefully turn E-FL-HB-0x00 to side.

2. Install four (4) rubber feet:
   - Separate rubber feet.
   - Remove protective paper from adhesive surface on rubber foot.
   - Position and secure each rubber foot as shown.

3. Return E-FL-HB-0x00 to upright position.
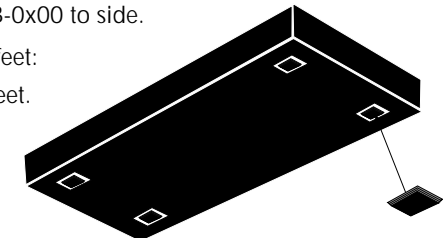
Optionally Connect to Backplane

THROUGH AUI UPLINK

NOTE: Refer to 5-4-3 rule (page 3) to keep network configuration within acceptable bounds.

50Ω Terminator

Earth Ground

50Ω Terminator
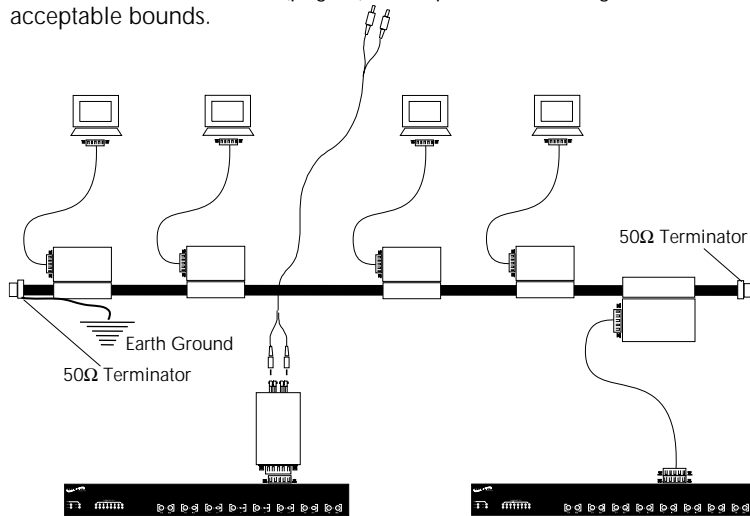
USING TRANSCEIVER

NOTE: Refer to transceiver documentation for detailed specifications and instructions.

1. Locate AUI uplink adapter installed at E-FL-HB-0x00 back. (See page 4.)

2. Locate IEEE 802.3 compliant transceiver with male AUI connector and with required network media connector.

3. Connect transceiver male AUI connector to the female AUI connector on E-FL-HB-0x00

4. Referring to transceiver documentation, connect transceiver network media connector to the network media.

USING DROP CABLE

NOTE: In a coax thicknet installation, each 10BASE-5 cable end must be terminated using a 50 ohm terminator. Additionally, the 10BASE-5 segment must be grounded to "earth ground" at one end.

1. Locate AUI uplink adapter installed at E-FL-HB-0x00 back. (See page 4.)

2. Locate or build IEEE 802.3 compliant AUI drop cable. (See page 14.)

3. Connect AUI drop cable male connector to female AUI (DTE) connector on E-FL-HB-0x00

OPERATION

Use the status LEDs to monitor E-FL-HB-0x00 operation in the network.
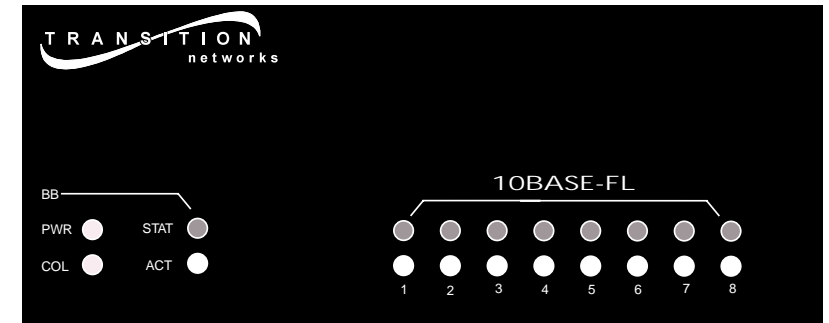
E-FL-0X00 HUB INDICATORS

P(o)W(e)R	Steady LED indicates E-FL-HB-0x00 is connected to external AC power.
COL(lision)	Flashing LED indicates network collisions.

B(ACK)B(ONE) INDICATORS

STAT(us)	Steady LED indicates, for network connection, a valid link and no partition or isolation.
	One (1) continuous, flashing blink indicates network link is down.
	Two (2) continuous, flashing blinks indicate reception of Far End Fault (if fiber uplink adapter is installed and LINKAlert™ is enabled) OR port is partitioned (if AUI or BNC or fiber uplink adapter with LINKAlert™ not enabled is installed).
ACT(ivity)	Flashing LED indicates reception of network data packet(s).

10BASE-FL INDICATORS

|	
STAT(us)	Steady LED indicates, for each port, a valid link and no partition or isolation.
	One (1) continuous, flashing blink indicates link is down.
	Two (2) continuous, flashing blinks indicate port is partitioned.
ACT(ivity)	Flashing LED indicates, for each port, reception of data packet(s).

Power the E-FL-HB-0x00

NOTE: When the hub is connected to an AC outlet supplying 100-240VAC at 50-60 Hz, the hub automatically powers ON

To power ON the E-FL-HB-0x00:
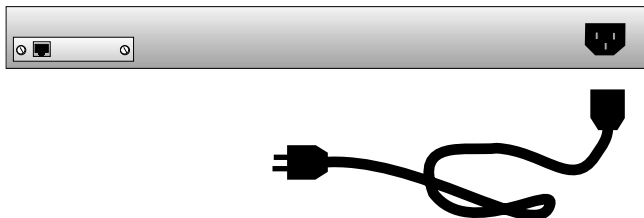
1. Locate power receptacle at back of E-FL-HB-0x00.
2. Plug unit end (female) of power cord into E-FL-HB-0x00 power receptacle.
3. Plug outlet end (male) of power cord into correct voltage AC wall socket.
4. At E-FL-HB-0x00 front, verify that *P(o)W(e)R* LED is illuminated.

4. Connect AUI drop cable female connector to the AUI port on a 10BASE-5 cable transceiver or media attachment unit (MAU).
5. Verify that 10BASE-5 segment is terminated at both ends using 50-ohm terminators.

THROUGH BNC UPLINK

NOTE: Refer to 5-4-3 rule (page 3) to keep network configuration within acceptable bounds.

NOTE: In a coax thinnet installation, the first and last device in the daisy-chain must be terminated using a 50 ohm terminator. Additionally, the 10BASE-2 segment must be grounded to "earth ground" at one end.

To connect to 10BASE-2 network:
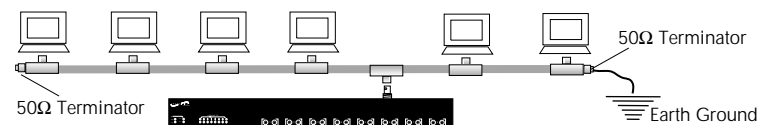
1. Locate BNC uplink adapter installed at E-FL-HB-0x00 back (See page 4.)
2. Locate or build IEEE 802.3 compliant 10BASE-2 cable and male BNC T-connector. (See page 14.)
3. Install the mating T-connector to the female BNC connector on the E-FL-HB-0x00
4. Install 10BASE-2 cable at one side of the T-connector.
5. Install 10BASE-2 cable at other side of T-connector OR, if the E-FL-HB-0x00 is the last network device in the daisy chain, install 50-ohm terminator.
6. Verify that the 10BASE-2 segment coax cable segment is terminated properly at both ends.
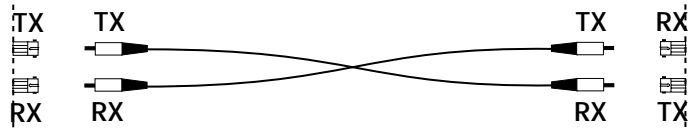
Optionally Connect to Backplane *(continued)*

THROUGH FIBER UPLINK

To connect fiber cable from E-FX-HB-xx00 10BASE-FL uplink adapter to network:
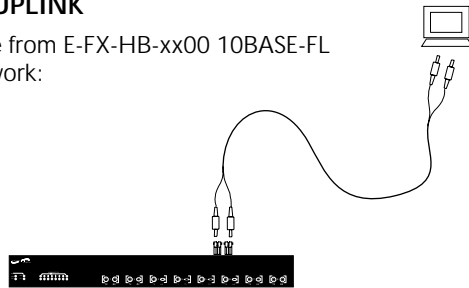
1. Locate 10BASE-FL uplink adapter installed at E-FL-HB-0x00 back. (See page 4.)

2. Locate or build 10BASE-FL compliant fiber cable with male two-stranded TX to RX connectors at both ends. (See page 14.)
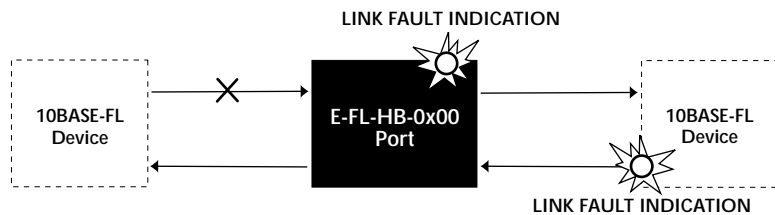

3. Connect male TX and RX cable connectors at one end of cable to TX and RX female connectors, respectively, on E-FL-HB-0x00 10BASE-FL uplink adapter.

4. Connect male TX and RX cable connectors at other end of cable to RX and TX connectors, respectively, on 802.3 compliant 10BASE-FL network device.

5. Set SWITCH 1 (located on the 10BASE-FL uplink adapter) to enable or to disable the LinkALERT™ function.
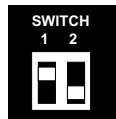
 (UP) Enables the *LinkALERT™* function. *(DOWN)* Enables standard Link Integrity Test. *Default is LinkALERT™ enabled (UP).*
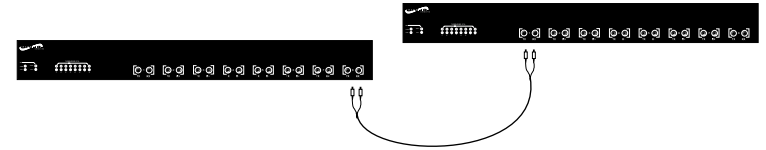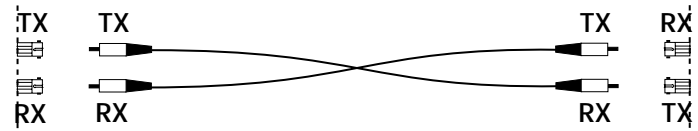
NOTE: SWITCH 2 is not used.

NOTE: The *LinkAlert™* feature allows each port to pass network link faults over the port link. If the port does not detect a good link on one side, the port disables all transmission (including active-idle) on the other side.

LINK FAULT INDICATION

10BASE-FL Device

E-FL-HB-0x00 Port

10BASE-FL Device

LINK FAULT INDICATION
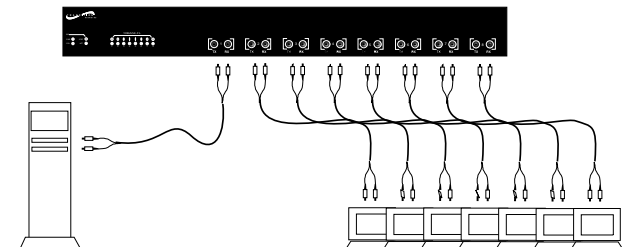
Optionally Cascade E-FL-0x00 Hubs

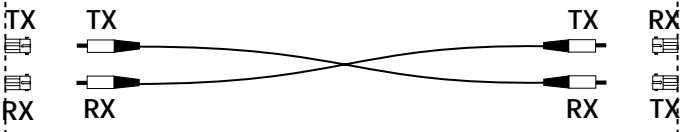To cascade hubs by installing fiber cables between hubs:

1. Locate or build 10BASE-FL compliant two-stranded fiber cable with appropriate male TX to RX connectors installed at both ends.

2. Connect male TX and RX cable connectors at one end of cable to TX and RX female connectors, respectively, on front of one hub.

3. Connect male TX and RX cable connectors at other end of cable to RX and TX connectors, respectively, on front of second hub.

Connect E-FL-0x00 Hub to Terminal Devices using Fiber

To connect fiber cable from E-FL-HB-0x00 ports to terminal devices:

1. Locate or build 10BASE-FL compliant two-stranded fiber cable with appropriate male TX to RX connectors installed at both ends.

2. Connect male TX and RX cable connectors at one end of cable to TX and RX female connectors, respectively, on E-FL-HB-0x00 port.

3. Connect male TX and RX cable connectors at other end of cable to RX and TX connectors, respectively, on 802.3 compliant fiber device.

4. Repeat steps 1-3 until all terminal devices are connected.